



**KRISHNASAMY**

College of

**ENGINEERING & TECHNOLOGY**

Approved by AICTE & Affiliated to Anna University

Anand Nagar, Nellikuppam Main Road, S. Kumarapuram, Cuddalore - 607 109, Tamil Nadu.

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## INTERNAL QUALITY ASSURANCE CELL (IQAC)

### Procedure for evaluating COs and POs

#### Terminology (Abbreviations)

- **OBE:** Outcome-Based Education (OBE) is a student-centric teaching and learning methodology in which the course delivery, assessment are planned to achieve stated objectives and outcomes. It focuses on measuring student performance i.e. outcomes at different levels.
- **Course Outcomes (CO):** Course Outcomes (COs) are specific and measurable statements that define the knowledge gained by the students at the end of a course. The most important aspect of a CO is that it should be observable and measurable
- **Program Outcomes (PO):** Program outcomes are specific and measurable statements that describe knowledge, skills and attitudes of the students at the time of graduation from an engineering program. That means just at the end of 4 years these represent what is the knowledge, skills and attitudes they should have. And at present POs are 12 in number and they are identified by NBA and are applicable to all engineering programs.
- **Program Educational Objectives (PEO) :** These are broad statements that describe the career and professional accomplishments in four to five years after graduation that the program is preparing the graduates to achieve
- **Program Specific Outcomes (PSO):** PSOs are outcomes that are specific to a program. PSOs characterize the specificity of the core courses of a program. PSOs can be 2 to 4 in number.



### Few definitions

#### Mapping Factor (Correlation Level)

It indicates to what extent a certain component (either assessment method to CO or CO to PO or PO to PEO & PSO)

- **3-indicates Substantial (high)** mapping (high contribution towards attainment)
- **2-indicates Moderate** (medium) mapping (medium contribution towards attainment)
- **1-indicates Slight (low)** mapping (some contribution towards attainment)

#### Setting CO Attainment Targets

Course wise threshold value (attainment) shall be fixed based on bench marks while level of attainment is retained as follows:

- Targets are quantized in to certain levels, 3 being the most common number of levels.
  - ✓ Level 3 : 70% of candidates attained the threshold value
  - ✓ Level 2 : 60% of candidates attained the threshold value
  - ✓ Level 1 : 50% of candidates attained the threshold value
- Aim is to attain Level 3

#### Attainment of COs

- Attainment of COs can be measured **directly** and **indirectly**
- Direct attainment of COs can be determined from the performances of students in all the relevant assessment instruments.
- Indirect attainment of COs can be determined from the course exit survey. The exit survey form should permit receiving feedback from students on all the COs.

#### Direct CO attainment

- Direct attainment of COs is determined from the performances of students in Continuous Internal Evaluation (CIE) and Semester End Examination (SEE).
- The proportional weightages of CIE: SEE will be as per the academic regulations in force. For regulation 2017 and 2021, the Proportions are 20:80 and 40:60 respectively.



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- Direct attainment of a specific COs is determined from the performances of students to all the assessment items related to that particular CO. Hence, every assessment item needs to be tagged with the relevant CO. Also, we need data about performance of students assessment item – wise.
- Continuous Internal Evaluation (CIE) is conducted and evaluated by the Department itself. Thus, institution have access to question-wise marks in all assessment instruments in CIE. When questions are tagged with relevant COs, the department has access to performances of students with respect to each CO.
- End Semester Examination (ESE) is conducted and evaluated by the Anna University. Thus, the departments get only total marks scored in ESE and not wise marks i.e. have no means of computing the direct attainment of individual COs from ESE

### **In Direct CO attainment from CES**

Indirect method such as course end survey is used to measure the students understanding about the subject and calculated based on the rubrics framed.

### **Evaluation of Course Outcomes**

Direct Assessment:

Courses offered	Evaluation tools	Frequency of Evaluation
Theory Courses	Continuous Internal Evaluation (CIE)	
	Internal Assessment Test (IAT)	Three per semester
	End Semester Examination (ESE)	Once per semester
Laboratory Courses	Continuous Internal Evaluation (CIE)	
	Continuous Evaluation	Assessed for every Experiment
	Model Examination	Once per semester
	End Semester Examination (ESE)	Once per semester
Mini Project & Project Work	Project Reviews (IA)	Three periodic reviews with clear rubrics
	End Semester Examination (ESE)	Once per semester

For all the above-mentioned evaluation tools, the attainment of all COs in each course is computed based on the knowledge level after setting the expected attainment level.



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### **Indirect Assessment:**(Feedback from students)

Evaluation tools	Frequency of Evaluations
Course End Survey	Once per semester

In the CO attainment calculation for a course 80% is contributed through direct assessment and 20% through indirect assessment. 20% weightage is given for CO attainment through student feedback for indirect assessment. At the end of the semester, feedback forms (course wise) are circulated and responses from the students are recorded.

### **Identification of curricular gap**

At the time of CO-PO mapping, the course in-charge has to identify the curricular gap in the course, based on the recent technological trends as well as feedback received from the students. After that, the course in-charge has to discuss with HOD about the steps to be taken to bridge the curricular gap. Content beyond the syllabus may be delivered to the students through teaching, arranging guest lectures, industrial visit, professional training, online quiz, etc

### **Evaluation of POs and PSOs**

The assessment of Program Outcome is carried out using data collected from Direct and indirect methods.

### **Direct assessment:**

POs and PSOs attainment through direct assessment are calculated for each course as follows:

Direct attainment can be computed for a batch using the below formula.

PO/PSO attainment = (CO attainment \* CO-PO Mapping)/Max correlation strength

$$\frac{\text{PO/PSO Attainment Average} * 100}{\text{Average of CO/PO Articulation Matrix}} \text{ (For each POs)}$$

### **Indirect Assessment:**

Indirect methods such as surveys and interviews of the stakeholders to reflect on student's learning. They assess opinions or thoughts about the graduates' knowledge or skills valued by different stakeholders.

The various indirect tools are: Program Exit Survey, Employer Survey and Alumni Survey

The average of PO attainment of all surveys is considered for calculating the PO Indirect attainment



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Evaluation tools	Frequency of Evaluations
Program Exit Survey	Yearly / End of the Program
Employer Survey	Once in a year
Alumni Survey	Once in year

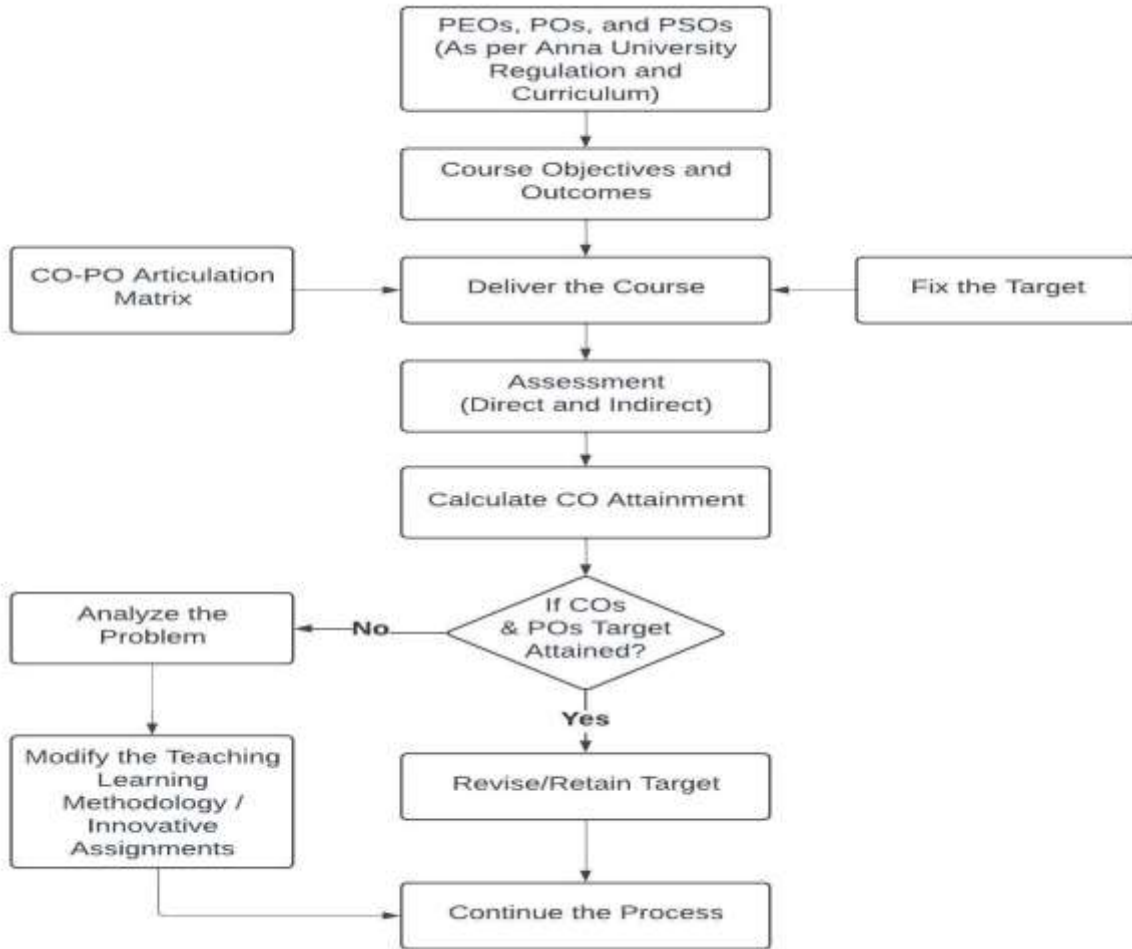
### **The PO/PSO attainment is calculated by fixing weightage as follows:**

The overall attainment values are calculated by considering 80% weightage to direct assessment and 20% weightage to indirect assessment

PO/PSO Attainment = 80% of Direct Attainment + 20% of Indirect Attainment

### **COs, POs and PSOs attainment calculation are as follows.**

Course wise threshold value (attainment) shall be fixed based on bench marks by the faculty in discussion with HoD while level of attainment is fixed by IQAC for each batch of the entire institute. Based on the assessment procedure, the COs articulation matrix is calculated for each course. COs Attainment is calculated based on the marks scored by the students in IAT1, IAT2, Model Examination, End Semester Examination (ESE) and CES. If the attainment is achieved, it is inferred that CO is achieved for that course. The gap is reviewed and analyzed, thereby adopting the effective teaching-learning methods for continuous improvements. Finally, POs are mapped with COs for each course at the end of the Programme; i.e., Final COs-POs attainment Matrix. If the POs/PSOs attainment is less than the target, reform the teaching and learning method in order to improve students' performance for upcoming batch in consultation with Head of the Department/Principal/IQAC Coordinator. The overall process of calculating COs, Pos and PSOs are explained in the flowchart given below.



### CO attainment Computation - Sample:(Direct & Indirect)

#### Direct attainment

#### STEP 1: CO – PO Articulation Matrix

For every subject Course Outcomes (COs) are defined and mapped to Program Outcomes (POs) on a scale of 0 to 3. Highest correlation is 3. For example,

Articulation Matrix (Refer the Syllabus)																
	CO No.	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO's	CO1	3	2	1										3	2	
	CO2	3	2	1										2	3	
	CO3	3	2	1										2	3	
	CO4	3	3	2										2	3	
	CO5	3	3	2										2	2	
	Average	3.00	2.40	1.40										2.20	2.60	



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### STEP 2: Calculation of CO attainment (for the batch) base on Internal Assessment Test

Maximum marks allotted to each question, mapped to a cognitive level and the corresponding CO. Record the percentage of students achieving a set percentage of max marks allotted to an individual CO in a given IAT. The performances of a student from three IATs are used for calculating attainment levels for CO. Repeat the above condition to evaluate all COs. The process is described below

For example,

Model Exam CO Attainment																							
Sl No	Register No	Name of the Student	CO1 (Total Marks Allotted)	CO1 (Marks Scored)	CO1 (%)	CO1 (Attainment)	CO2 (Total Marks Allotted)	CO2 (Marks Scored)	CO2 (%)	CO2 (Attainment)	CO3 (Total Marks Allotted)	CO3 (Marks Scored)	CO3 (%)	CO3 (Attainment)	CO4 (Total Marks Allotted)	CO4 (Marks Scored)	CO4 (%)	CO4 (Attainment)	CO5 (Total Marks Allotted)	CO5 (Marks Scored)	CO5 (%)	CO5 (Attainment)	Total Marks
1	421320104001	AARTHIS	17	10	59	Yes	17	15	88	Yes	17	10	59	Yes	17	15	88	Yes	32	24	75	Yes	74
2	421320104002	AFREENA A	17	15	88	Yes	17	15	88	Yes	17	15	88	Yes	17	15	88	Yes	32	24	75	Yes	84
3	421320104003	ARULDOSS N	17	10	59	Yes	17	10	59	Yes	17	10	59	Yes	17	10	59	Yes	32	10	31	No	50
4	421320104004	ASHIBA BEGAM M	17	10	59	Yes	17	10	59	Yes	17	10	59	Yes	17	10	59	Yes	32	24	75	Yes	64
5	421320104005	BALAJIT	17	15	88	Yes	17	15	88	Yes	17	15	88	Yes	17	15	88	Yes	32	16	50	No	76
6	421320104006	BARANIS	17	10	59	Yes	17	10	59	Yes	17	10	59	Yes	17	10	59	Yes	32	21	66	Yes	61
7	421320104007	BAVITHRA V	17	17	100	Yes	17	17	100	Yes	17	16	94	Yes	17	10	59	Yes	32	25	72	Yes	83
8	421320104008	DHINESH KUMAR S	17	2	12	No	17	0	0	No	17	0	0	No	17	0	0	No	32	0	0	No	2
9	421320104009	DURGALAKSHMI V	17	10	59	Yes	17	10	59	Yes	17	10	59	Yes	17	10	59	Yes	32	28	88	Yes	68
10	421320104010	GUNASEKARAN V	17	0	0	No	17	0	0	No	17	3	16	No	17	17	100	Yes	32	20	63	Yes	40
11	421320104011	HARIHARA SUDHAN K	17	-	-	No	17	-	-	No	17	-	-	No	17	-	-	No	32	-	-	No	AB
12	421320104012	HARISH B	17	5	29	No	17	5	29	No	17	5	29	No	17	5	29	No	32	1	3	No	21
13	421320104013	JEEVITHA G	17	15	88	Yes	17	15	88	Yes	17	15	88	Yes	17	15	88	Yes	32	20	63	Yes	80
14	421320104014	KAMIL MOHAMED NS	17	10	59	Yes	17	5	29	No	17	5	29	No	17	0	0	No	32	20	63	Yes	40

CO Attainment Summary					
Particulars	CO1	CO2	CO3	CO4	CO5
Total No. of Students	55	55	55	55	55
Total No. of Students Achieved the Target CO%	44	42	43	39	39
Ratio	80	76	78	71	71
CO Attainment	3	3	3	3	3

Total marks Allotted (Model)	100
Total No. of the Students	58
Total No. of Students Attended	55
Target CO%	52



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### STEP 3: Calculate the attainment levels based on End Semester Examinations

End Semester Exam (ESE) Attainment					
S. No	Register No	Name of the Student	UE Grade	UE Points	Marks
1	421320104001	AARTHI S	B+	7	70
2	421320104002	AFREENA A	B+	7	70
3	421320104003	ARULDOSS N	U	0	0
4	421320104004	ASHIBA BEGAM M	B+	7	70
5	421320104005	BALAJI T	B	6	60
6	421320104006	BARANI S	B+	7	70
7	421320104007	BAVITHRA V	B	6	60
8	421320104008	DHINESH KUMAR S	U	0	0
9	421320104009	DURGALAKSHMI V	B	6	60
10	421320104010	GUNASEKARAN V	B	6	60
11	421320104011	HARIHARA SUDHAN K	B	6	60
12	421320104012	HARISH B	B	6	60
13	421320104013	JEEVITHA G	A	8	80
14	421320104014	KAMIL MOHAMED MS	B	6	60
15	421320104015	KEERTHIGA M	A+	9	90
16	421320104016	KEERTHIGA S	B+	7	70
17	421320104017	KURALARASAN JR	B+	7	70

Maximum Marks allotted	100
Total No. of the Students	58
Total No. of Students Appeared for UE	58
Target CO%	52

CO Attainment Summary					
Particulars	CO1	CO2	CO3	CO4	CO5
Total No. of Students	58	58	58	58	58
Total No. of Students	53	53	53	53	53
Ratio	91	91	91	91	91
CO Attainment	3	3	3	3	3

### STEP 4 : Calculation of CO attainment (for the batch) base on indirect assessment tool.

#### Survey: Course Exit Survey (CES)

CES form will be circulated to each student who has undergone the course

Course Exit Survey					
Faculty Name		Designation/ Department			
Subject Code		Subject Name			
Student Name		Roll.no/ Reg.no			
Program		Semester			
Academic Year		Batch			
Rating: 3 for Substantial, 2 for Moderate, and 1 for Slight					
CO.no	Questionnaire	Slight 1	Moderate 2	Substantial 3	
CO1	Ability to Understand the fundamentals of networks security, security architecture, threats and vulnerabilities				
CO2	Ability to Apply the different cryptographic operations of symmetric cryptographic algorithms				
CO3	Ability to the different cryptographic operations of public key cryptography				
CO4	Ability to the various Authentication schemes to simulate different applications.				
CO5	Ability to Understand various Security practices and System security standards				





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### Consolidate CES Report

#### Course Exit Survey Attainment

S.No	Register No	Name of the Student	CO1 (Total Points Allocated)	CO1 (Response)	CO1 (%)	CO1 (Attainment)	CO2 (Total Points Allocated)	CO2 (Response)	CO2 (%)	CO2 (Attainment)	CO3 (Total Points Allocated)	CO3 (Response)	CO3 (%)	CO3 (Attainment)	CO4 (Total Points Allocated)	CO4 (Response)	CO4 (%)	CO4 (Attainment)	CO5 (Total Points Allocated)	CO5 (Response)	CO5 (%)	CO5 (Attainment)
1	421320104001	AARTHIS	3	3	100	Yes	3	2	67	Yes	3	3	100	Yes	3	3	100	Yes	3	3	100	Yes
2	421320104002	AFREENA A	3	3	100	Yes	3	3	100	Yes	3	3	100	Yes	3	3	100	Yes	3	2	67	Yes
3	421320104003	ARULDOSS N	3	3	100	Yes	3	3	100	Yes	3	3	100	Yes	3	2	67	Yes	3	3	100	Yes
4	421320104004	ASHITA BEGAM M	3	3	100	Yes	3	3	100	Yes	3	3	100	Yes	3	3	100	Yes	3	2	67	Yes
5	421320104005	BALAJI T	3	3	100	Yes	3	3	100	Yes	1	2	200	Yes	3	3	100	Yes	3	3	100	Yes
6	421320104006	BARANIS	3	3	100	Yes	3	3	100	Yes	3	3	100	Yes	3	3	100	Yes	3	3	100	Yes
7	421320104007	BAVITHRA V	3	3	100	Yes	3	3	100	Yes	3	1	33	No	3	2	67	Yes	3	2	67	Yes
8	421320104008	DHINESH KUMAR S	3	3	100	Yes	3	3	100	Yes	3	3	100	Yes	3	3	100	Yes	3	3	100	Yes
9	421320104009	DURGALAKSHMI V	3	3	100	Yes	3	2	67	Yes	3	3	100	Yes	3	3	100	Yes	3	3	100	Yes
10	421320104010	GUNASEKARAN V	3	2	67	Yes	3	3	100	Yes	3	3	100	Yes	3	2	67	Yes	3	3	100	Yes
11	421320104011	HARIHARA SUDHAN K	3	3	100	Yes	3	3	100	Yes	3	3	100	Yes	3	3	100	Yes	3	3	100	Yes
12	421320104012	HARISH B	3	3	100	Yes	3	3	100	Yes	3	3	100	Yes	3	3	100	Yes	3	3	100	Yes
13	421320104013	JEEVITHA G	3	3	100	Yes	3	3	100	Yes	3	3	100	Yes	3	3	100	Yes	3	3	100	Yes
14	421320104014	KAMIL MOHAMED MS	3	1	33	No	3	3	100	Yes	3	3	100	Yes	3	3	100	Yes	3	3	100	Yes

<b>Total Points Allotted (3 Scale)</b>	<b>100</b>
<b>Total No. of the Students</b>	<b>58</b>
<b>Total No. of Students (Based on Response)</b>	<b>58</b>
<b>Target CO%</b>	<b>52</b>

CO Attainment Summary					
Particulars	CO1	CO2	CO3	CO4	CO5
Total No. of Students	75	75	75	75	75
Total No. of Students Achieved the Target CO%	58	58	58	58	58
Ratio	77	77	77	77	77
CO Attainment	3	3	3	3	3



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### STEP 5: CO Attainment

For R2017: Course attainment = 0.2 \* IAT attainment + 0.8 \* ESE

For R2021: Course attainment = 0.4 \* IAT attainment + 0.6 \* ESE



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Course Code:		CS8792											
Name of the Course:		CRYPTOGRAPHY AND NETWORK SECURITY											
Branch / Year of Study:		CSE/IV YEAR											
CO Attainment (Internal marks)						Direct CO Attainment							
Particulars	CO1	CO2	CO3	CO4	CO5	Particulars	Weights	CO1	CO2	CO3	CO4	CO5	
IA1	1.00	1.00				CIE	0.20	2.00	2.00	2.00	2.50	3.00	
IA2			1.00	2.00		ESE	0.80	3.00	3.00	3.00	3.00	3.00	
Model	3.00	3.00	3.00	3.00	3.00	Direct CO Attainment		2.80	2.80	2.80	2.90	3.00	
CIE	2.00	2.00	2.00	2.50	3.00								
Final CO Attainment											Level 0	Less than 49	
Particulars	Weights	CO1	CO2	CO3	CO4	CO5							
Direct CO	0.80	2.80	2.80	2.80	2.90	3.00						Level 1	50 - 59
CES	0.20	3.00	3.00	3.00	3.00	3.00						Level 2	60 - 69
Final CO Attainment		2.84	2.84	2.84	2.92	3.00						Level 3	70 - 100

### STEP 6: Identification of curricular gap

At the time of CO-PO mapping, the course in-charge has to identify the curricular gap in the course, based on the recent technological trends as well as feedback received from the students. After that, the course in-charge has to discuss with HOD about the steps to be taken to bridge the curricular gap. Content beyond the syllabus may be delivered to the students through teaching, arranging guest lectures, industrial visit, professional training, online quiz, etc



### POs and PSOs attainment sample

#### **Program outcomes attained through the attainment of COs.**

For a given course, all COs are mapped to certain Pos. The overall CO attainment value as computed and the CO-PO mapping values are used to compute the attainment of POs.

The PO attainments of all the core courses are listed and the average PO attainments are calculated. Then the average PO attainments are compared with the target PO to check whether the POs are attained at Programme level or not

#### **STEP 7 :POs and PSOs attainment:(Direct)**

PO attainment can be computed for a batch using the below formula.

PO/PSO attainment = (CO attainment \* CO-PO Mapping)/Max correlation strength

$$\frac{\text{PO/PSO Attainment Average} * 100}{\text{Average of CO/PO Articulation Matrix}} \quad (\text{For each POs})$$

Same process is repeated for all the POs.

#### **Final CO attainment w.r.t PO and PSO**

Final CO-PO attainment															
CO Attainment	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2.84	2.84	1.89	0.95									2.84	1.89	
CO2	2.84	2.84	1.89	0.95									1.89	2.84	
CO3	2.84	2.84	1.89	0.95									1.89	2.84	
CO4	2.92	2.92	2.92	1.95									1.95	2.92	
CO5	3.00	3.00	3.00	2.00									2.00	2.00	
PO/PSO Attainment	2.89	2.32	1.36										2.11	2.50	
Overall PO/PSO	96.27	96.67	96.95										96.12	96.10	



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Name of the Department:		Computer Science and Engineering				Assessment Batch:	2019-2023			Total No. of Courses Offered:	63										
POs & PSO's - Direct Attainment (Course Outcomes)																					
S.No.	SEM	Course Code	Course Name	PO's										PSO's							
				PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3			
1	I	HS0151	Communicative English									1.37	1.57	1.35		1.81		1.91	1.59		
2		MA0151	Engineering Mathematics - I	0.91	1.01	0.90								0.90				0.92	0.89		
3		PH0151	Engineering Physics	1.03	1.05	0.84												1.01			
4		CY0151	Engineering Chemistry	1.81	2.72	1.81													2.72		
5		GER151	Problem Solving and Python Programming	1.76	1.57	1.26												1.54	1.43	1.39	
6		GER152	Engineering Graphics	1.59	1.16	1.02		1.18					1.30	0.87	1.32		0.99	1.02	0.87	0.72	
7		GER161	Problem Solving and Python Programming Laboratory	3.00	3.00	3.00		3.00					3.00	3.00	3.00		3.00	3.00	3.00	3.00	
8		BS0161	Physics and Chemistry Laboratory	3.00	3.00	2.00							1.00	3.00	2.00			3.00	1.00	2.00	
9	II	HS0251	Technical English									1.75	1.35	1.55		1.75			1.80		
10		MA0251	Engineering Mathematics - II	1.29	1.47	1.67								1.32				1.86	1.68		
11		PH0201	Physics for Information Science	1.53	1.74	1.54												1.33			
12		BE0250	Basic Electronics, Electronics and Measurement Experiments	1.53	1.35	1.33													1.31		
13		GER291	Environmental Science and Engineering	1.35	1.15	1.35					1.33	1.53	1.17	1.16		1.13	1.33	1.33	1.15		
14		CS0251	Programming in C	1.71	1.53	1.33							1.54	1.14	1.53		1.51	1.91	1.72	1.33	
15		GER261	Engineering Practices Laboratory	3.00	3.00	3.00	3.00	3.00	3.00				3.00	3.00	3.00		3.00	3.00	3.00	3.00	
16		CS0261	C Programming Laboratory	3.00	3.00	3.00							3.00	3.00	3.00		3.00	3.00	3.00	3.00	
17	III	MA0351	Discrete Mathematics	1.36	1.37	1.43							0.96				1.17	1.43	0.95		
18		CS0351	Digital Principles and System Design	2.17	2.42	2.18												1.93	3.00		
19		CS0391	Data Structures	1.67	2.67	1.00												2.00	2.00	1.33	
20		CS0392	Object Oriented Programming	0.99	2.97	1.74												2.17	1.74	0.99	
21		ECK095	Communication Engineering	2.92	2.68	2.08												2.68	1.95	2.92	
22		CS0381	Data Structures Laboratory	3.00	3.00	1.00							2.33	2.00	2.00		2.00	3.00	2.00	1.00	
23		CS0383	Object Oriented Programming Laboratory	3.00	2.33	2.33							2.33	2.00	2.00		2.00	3.00	2.00	1.33	
24		CS0382	Digital Systems Laboratory	1.25	2.00	1.00			2.00				2.33	2.00	3.00		2.00	1.75	2.00	2.00	
25	IV	HS0381	Interpersonal Skills Listening & Speaking									2.00	1.75	1.50		1.33			1.67		
26		MA0402	Probability and Queuing Theory	1.88	0.94	0.94										0.95	1.33	1.61	0.94	0.97	
27		CS0401	Computer Architecture	0.95	1.90	1.70													1.90		
28		CS0492	Database Management Systems	0.71	1.42	1.27													1.42		
29		CS0451	Design and Analysis of Algorithms	2.18	1.45	1.20								0.97	1.45		1.22	1.95	1.95		
30		CS0452	Operating Systems	1.29	0.98	1.29													1.46	1.46	
31		CS0494	Software Engineering	0.83	1.66	0.82		0.66	0.87				1.00	1.32	1.38		1.00	0.99	1.98		
32		CS0481	Database Management Systems Laboratory	3.00	2.00	2.00							2.00	1.80	1.80		1.00	2.00	2.00		
33	V	CS0461	Operating Systems Laboratory	3.00	2.00	2.00							2.00	1.83	1.83		1.00	3.00	2.00	1.00	
34		HS0461	Advanced Reading and Writing										2.00	1.25	1.75		1.50			1.25	
35		MA0551	Algebra and Number Theory	2.00	1.40	1.40								1.20				1.80	1.80	1.75	
36		CS0591	Computer Networks	1.60	1.92	0.96												1.93	0.91	0.95	
37		EC0691	Microprocessors and Microcontrollers	1.96	1.96	1.96												1.96	1.96	0.95	
38		CS0501	Theory of Computation	1.00	1.60	1.20													2.00	1.00	1.00
39		CS0592	Object Oriented Analysis and Design	0.99	2.77	2.37		0.99										2.16	2.37		
40		OCT552	Geographic Information Systems	1.80	2.00	2.00					1.00				2.00		1.80		2.00	1.00	
41	VI	EC0681	Microprocessors and Microcontrollers	2.00	2.00	2.00							2.00	3.00	3.00		2.00	2.20	2.00	2.20	
42		CS0582	Object Oriented Analysis and Design Laboratory	2.75	1.75	1.75		2.25	2.75				2.00	3.00	3.00		2.00	1.75	2.00		
43		CS0581	Networks Laboratory	3.00	2.00	2.50							2.00	1.00	3.00		2.00	3.00	3.00		
44		CS0651	Internet Programming	1.63	0.95	1.09							1.09	0.95	1.23		0.95	1.21	1.21		
45		CS0691	Artificial Intelligence	0.77	1.39	1.09													1.54	0.77	
46		CS0601	Mobile Computing	1.44	0.79	0.79													0.66		
47		CS0602	Compiler Design	0.76	1.52	1.41							0.76	0.76	0.51		0.76	1.52	1.19	0.76	
48		CS0603	Distributed Systems	0.98	1.86	1.77													1.96		
49	VII	FI0756	Software Testing	0.91	0.91	0.91		1.06					0.90	1.63				0.90		0.95	
50		CS0661	Internet Programming Laboratory	3.00	2.00	2.00		2.00					1.00	1.20	1.40		1.20	2.00	2.20		
51		CS0662	Mobile Application Development Laboratory	1.80	1.80	1.80		1.80	2.00				1.80	1.00	1.40		1.40	1.00	1.00		
52		CS0611	Mini Project	2.00	3.00	2.00	2.00	1.00	2.00	2.00	1.00	2.00	2.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	
53		HS0801	Professional Communication						2.00						1.75		1.50			1.25	
54		CS0791	Cloud Computing	0.97	1.51	2.40													2.23		0.78
55		CS0792	Cryptography and Network Security	3.00	2.40	1.40													2.20	2.60	
56		OBT752	Hospital Management	1.55	1.55	0.74										1.35			0.78	0.78	
57	VIII	MGR891	Principles of Management	1.98	1.98	0.99										1.98		0.99	0.99		
58		GER007	Total Quality Management	1.99	1.99	0.99										2.00			0.99	0.99	
59		FI0761	Security Laboratory	2.00	1.80	1.80		1.60					1.60	1.20	1.20		1.40	2.00	3.00		
60		CS0711	Cloud Computing Laboratory	1.00	1.60	1.20		2.80					2.00	1.00	2.00		1.00	2.00	2.00	2.00	
61		CS0754	Cyber Forensics	1.59	1.24	1.41								1.24					0.89	0.89	1.24
62		CS0800	Information Retrieval Techniques	1.34	1.12	1.34													0.90	0.90	1.12
63		CS0811	Project Work	2.00	3.00	2.00	3.00	1.00	2.00	2.00	1.00	2.00	2.00	1.00	1.00	1.00	2.00	2.00	2.00	2.00	
Average (PO & PSO Direct Attainment):				1.77	1.87	1.59	2.67	1.72	2.09	1.58	1.76	1.62	1.85	1.42	1.57	1.85	1.72	1.53			
Theoretical Value (As per regulation):				1.89	1.99	1.71	2.67	1.79	2.09	1.69	1.83	1.69	1.97	1.70	1.67	1.99	1.78	1.60			



# KRISHNASAMY

College of

## ENGINEERING & TECHNOLOGY

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### STEP 8: POs-PSOs attainment:(Indirect)

Indirect methods such as surveys and interviews of the stakeholders to reflect on student's learning. They assess opinions or thoughts about the graduates' knowledge or skills valued by different stakeholders.

The various indirect tools are: Program Exit Survey, Employer Survey and Alumni Survey

The average of PO attainment of all surveys is considered for calculating the PO Indirect attainment

### POs & PSOs Indirect Survey

#### Calculation of PO attainment (for the batch) based on indirect assessment tools

#### Alumni Feedback Form (to assess program outcomes)

Collect variety of information about program outcomes from the outgoing students

POs and PSOs - InDirect Survey				
ALUMNI FEEDBACK				
Name of the student:				
Batch:				
Current Position:				
Contact Number/Mail id:				
Dear Alumni, We kindly request you to provide your valuable feedback towards the betterment of our program. This will be helpful to us in improving the POs and PSOs attainment and make necessary changes to improve our academic activities to meet the expectations of Industry /Society. We appreciate your help in filling up this survey. Thank you for your cooperation and support. Indicate the extent to which you agree each of the following statements.				
Rating: 3 for Substantial, 2 for Moderate, and 1 for Slight				
Q. No.	Questionnaire	Slight 1	Moderate 2	Substantial 3
1	Are you pursuing any higher studies?			
2	What is your current career position?			
3	Have you been working as a consultant adopting any new technologies/Entrepreneur?			
4	Are you enthusiastic in learning new technologies in the field of engineering?			
5	Are you able to apply knowledge and technical skills so as to carry out tasks in the engineering field as and when required			
6	Are you able to understand the social and global issues to be considered while providing engineering solutions?			
7	Are there instances when you are able to improve upon the design that was originally suggested?			
8	Are you able to integrate the knowledge acquired to provide optimal solution to the research / real-time problems?			
9	Do you use modern technologies, processes, and software / tools?			
10	Are you able to vary communication in your professional transaction?			
11	Do you follow professional and ethical code of conduct to perform a given task?			
12	Do you participate in collaborative projects / working groups in your workplace to meet common goals?			
13	Do you attend any conferences or seminars in your field to upgrade your skills?			
14	How well did your education prepare you for personal development?			



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### Program exit survey form (to assess program outcomes)

Collect variety of information about program outcomes from the outgoing students

POs and PSOs - InDirect Survey				
PROGRAM EXIT SURVEY (GRADUATE SURVEY)				
Department:		Date:		
Name of the student:				
Register No:				
Batch:				
Dear Alumni,				
We Kindly request you to provide your valuable feedback related to POs and PSOs. This will be helpful to us in improving the POs and PSOs attainment and make necessary changes to improve our academic activities to meet the expectations of Industry /Society. Please rate our alumni in respect to the following aspects.				
<b>Rating: 3 for Substantial, 2 for Moderate, and 1 for Slight</b>				
Q. No.	Questionnaire	Slight	Moderate	Substantial
		1	2	3
1	Ability to apply knowledge of mathematics, basic science and engineering science.			
2	Ability to Identify, formulate and solve engineering problems.			
3	Ability to Design an electrical system or process to improve its performance, satisfying its constraints.			
4	Ability to Conduct experiments in electrical and electronics systems and interpret the data.			
5	Ability to Apply various tools and techniques to improve the efficiency of the system.			
6	Ability to Conduct themselves to uphold the professional and social obligations.			
7	Ability to Design the system with environment consciousness and sustainable development.			
8	Ability to Interacting industry, business and society in a professional and ethical manner.			
9	Ability to Function in a multidisciplinary team.			
10	Ability to Proficiency in oral and written Communication.			
11	Ability to Implement Cost effective and improved system.			
12	Ability to Continue professional development and learning as a life-long activity.			
13	Ability to analyze design and develop computing solutions by applying fundamental concepts.			
14	Ability to Apply software engineering principles and practices for developing quality software for scientific and business application			



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### Employer Survey form (to assess program outcomes)

Collect variety of information about the graduates' skills, capabilities and opportunities

POs and PSOs - InDirect Survey				
EMPLOYER FEEDBACK				
Academic Year :			Date:	
Name of the Employer :				
Designation of the Employer:				
Contact no/Mail id :				
Organization Name:				
Dear Sir / Madam,				
We Kindly request you to provide your valuable feedback in respect to our alumni working in your esteemed organization. It will be helpful to us to make necessary changes to in our curriculum/ syllabus and activities / Training to improve students employability skills to meet the expectations of the Industry /Society. Please rate our alumni in respect to the following aspects.				
Rating: 3 for Substantial, 2 for Moderate, and 1 for Slight				
Q. No.	Questionnaire	Slight	Moderate	Substantial
		1	2	3
1	Are KCET graduates engaged in research and development activities?			
2	Are KCET graduates in any key positions in your organization?			
3	Do you think KCET graduates have the ability to work as a freelance consultant?			
4	Do KCET graduates have an understanding of professional and ethical responsibility in Professional practice?			
5	Do you think graduates from KCET possess the technical knowledge and skill needed to fulfill the job function?			
6	Do KCET graduates exhibit analytical skills?			
7	Do KCET graduates possess the knowledge and skills to devise solutions to unfamiliar problems?			
8	Did you find KCET graduates able to learn a new tool or procedure or technique as and when required?			
9	Are KCET graduates aware of the importance of social & global aspects ?			
10	How much are KCET graduates aware of the effect of their work quality towards safety, society and environment?			
11	Do KCET graduates work under stress well and are adaptable to changes in environment?			
12	Do KCET graduates perform as individual, in a team, and exhibit leadership qualities?			
13	Can KCET graduates vary their approach in written and verbal communication according to the person or			







**PO and PSO attainment Batch Wise Analysis - Sample**

**STEP 9 :PO&PSO Attainment Gap Analysis**

Every Faculty needs to compute two main attainment values as mentioned below. Based on that if target is not attained then appropriate actions should be taken.

- Course attainment
- Course w.r.t PO attainment

Department HOD needs to compute batch wise PO and PSO attainment and needs to analyze the gaps and take necessary actions

**PO and PSO attainment analysis: 2019-2023 batch**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING  
B.E COMPUTER SCIENCE AND ENGINEERING  
Details of PO and PSO Attainment levels for the batch 2019-2023 and Actions for  
Improvement-2020-2024**

POs	Target Level	Attainment Level	Observation
<b>PO1. Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.			
PO1	1.89	1.77	The attainment level is nearly achieved to the Target Level.
<b>Action 1:</b> Assignments are given to slow learners. <b>Action2:</b> Additional Maths classes will be conducted during the semester after each internal assessment based on the performance. <b>Action3:</b> A practical explanation will be given with the aid of a video presentation. <b>Action4:</b> Recommended to utilize library hours effectively by monitoring students to ensure they use journals, magazines, reference books, NPTEL videos, and internet facilities to stay updated on the latest technological developments related to their courses			
<b>PO2. Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.			
PO2	1.99	1.82	The attainment level is closer to the Target Level.
<b>Action 1:</b> Faculty members will insist the students take on mini-projects to solve engineering problems. <b>Action2:</b> During laboratory class, students are encouraged to do extra programs beyond the syllabus, which helps them increase their problem-solving skills.			
<b>PO3. Design/development of solutions:</b> Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.			
PO3	1.71	1.54	The attainment level is nearly achieved to the target Level.
<b>Action1:</b> Hackathon events will be conducted to motivate students to explore the latest technologies.			